PORTLAND HARBOR INITIAL REVIEW OF ALTERNATIVES

DICK/DENNIS/JIM BRIEFING

DEVELOPMENT OF ALTERNATIVES

- COMBINATION OF TECHNOLOGIES
  - USED FOR ALL ALTERNATIVES, EXCEPT ALTERNATIVE A
- TECHNOLOGIES INCLUDE:
  - DREDGING
  - CAPPING
  - IN-SITU TREATMENT
  - EX-SITU TREATMENT
  - EMNR
  - MNR
  - INSTITUTIONAL CONTROLS

TREATMENT ASSUMPTIONS

- PTW AND GROUNDWATER PLUMES
- IN-SITU TREATMENT
  - ACTIVATED CARBON
  - ORGANOPHILIC CLAY
  - SOLIDIFICATION/STABILIZATION (UNDER STRUCTURES)
- EX-SITU TREATMENT
  - THERMAL DESORPTION

PRINCIPAL THREAT WASTE

- SOURCE MATERIAL
  - NAPL
  - CHLOROBENZENE - ARKEMA
  - PAHS – GASCO
  - HIGHLY TOXIC OR HIGHLY MOBILE

- HIGHLY TOXIC – EXCEEDS 10^{-3} CANCER RISK
  - PCBs > 200 µg/kg
  - cPAHS > 100,000 µg/kg
  - DDx > 7000 µg/kg
  - 2,3,7,8-TCDD > 0.02 µg/kg
  - 2,3,7,8-TCDF > 4 µg/kg
  - 1,2,3,7,8-PECDD > 0.01 µg/kg
  - 2,3,4,7,8-PECDF > 0.4 µg/kg
  - 1,2,3,4,6,7,8-HXCDF > 0.3 µg/kg

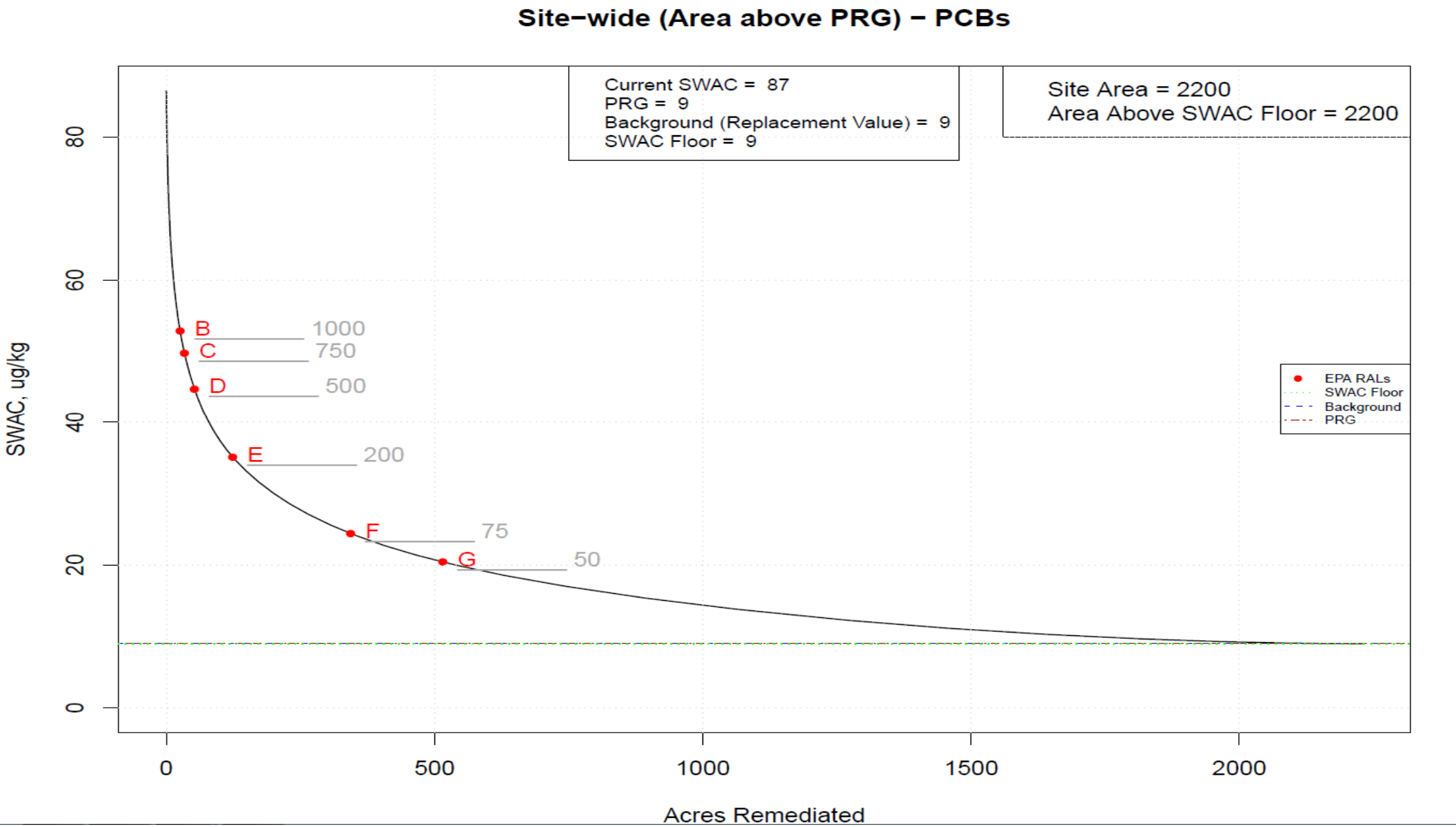
SEDIMENT MANAGEMENT AREAS

- BASED ON REMEDIAL ACTION LEVELS FOR FOCUSED COCS
  - PCBS
  - TOTAL PAHS
  - 1,2,3,7,8-PECDD
  - 2,3,4,7,8-PECDF
  - 2,3,7,8-TCDD
  - DDx
- CHANGE THROUGHOUT THE ALTERNATIVES

Source Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

REMEDIAL ACTION LEVELS

- MAXIMUM INCREMENTAL REDUCTION OF THE SWAC
  - B RAL (FURTHER INCREASES IN SWAC CONCENTRATIONS RESULTS IN MINIMAL INCREASE IN ACRES CAPPED/DREDGED)
- MARGINAL INCREMENTAL REDUCTION OF THE SWAC
  - G RAL (FURTHER INCREASES IN ACRES CAPPED/DREDGED DO NOT RESULT IN DISCERNABLE REDUCTIONS IN SWAC CONCENTRATIONS)
- KNEE OF THE CURVE
  - E RAL (INCREMENTAL INCREASED ACRES CAPPED/DREDGED BECOMES GREATER THAN THE INCREMENTAL REDUCTION OF THE SWAC)
- SPATIAL DISTRIBUTION
  - RALS C, D, F

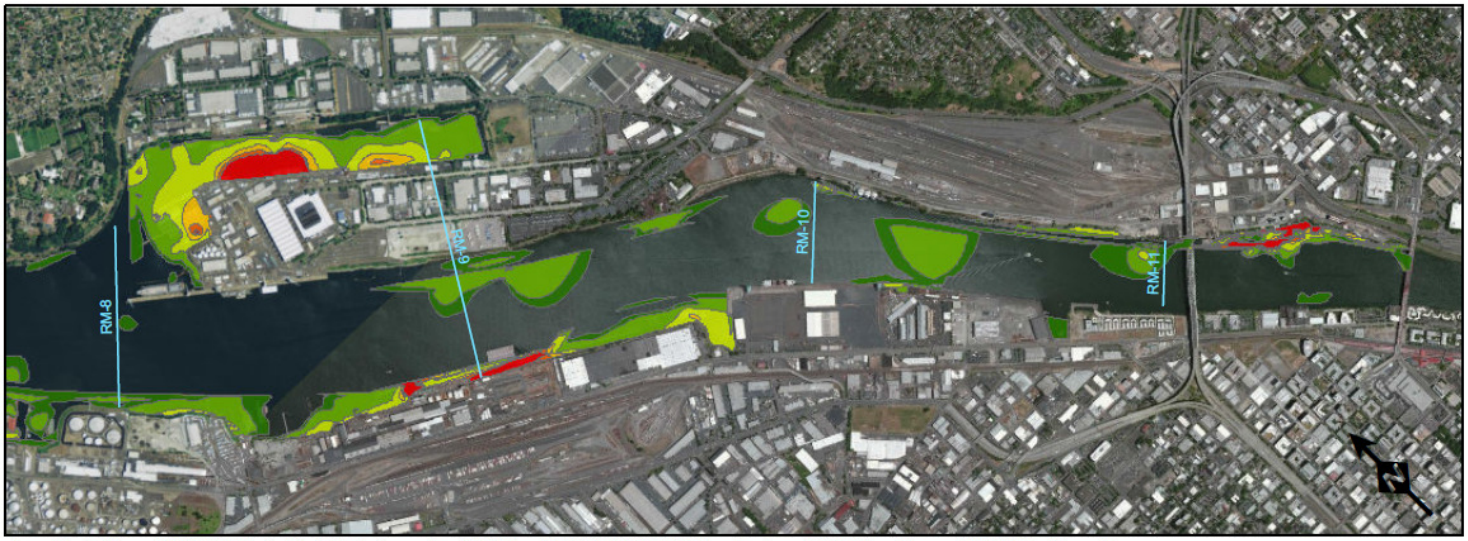

Site−wide (Area above PRG) − PCBs
Current SWAC = 87
PRG = 9
Background (Replacement Value) = 9
SWAC Floor = 9
Site Area = 2200
Area Above SWAC Floor = 2200
B 1000
C 750
D 500
E 200
F 75
G 50
EPA RALs
SWAC Floor
Background
PRG
SWAC, ug/kg
0
20
40
60
80
0
500
1000
1500
2000
Acres Remediated

REMEDIAL ACTION LEVELS

NEEDS TO DREDGE OR CAP

ALL UNITS (µg/kg)

Contaminant	B	C	D	E	F	G
PCBs	1,000	750	500	200	75	50
Total PAHs	170,000	130,000	69,000	35,000	13,000	5,400
1,2,3,7,8-PeCDD*	1	1	1	0.2	0.2	0.009
2,3,4,7,8-PeCDF*	0.003	0.002	0.0008	0.0008	0.0008	0.0008
2,3,7,8-TCDD*	0.002	0.002	0.002	0.0006	0.0006	0.0006
DDx	650	550	450	300	160	40



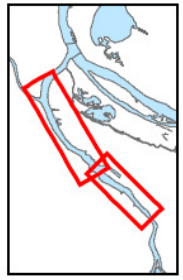
Legend

PCB RAL Alternatives

- Alternative B
- Alternative C
- Alternative D
- Alternative E
- Alternative F
- Alternative G

0 1,000 2,000 3,000 4,000

Feet



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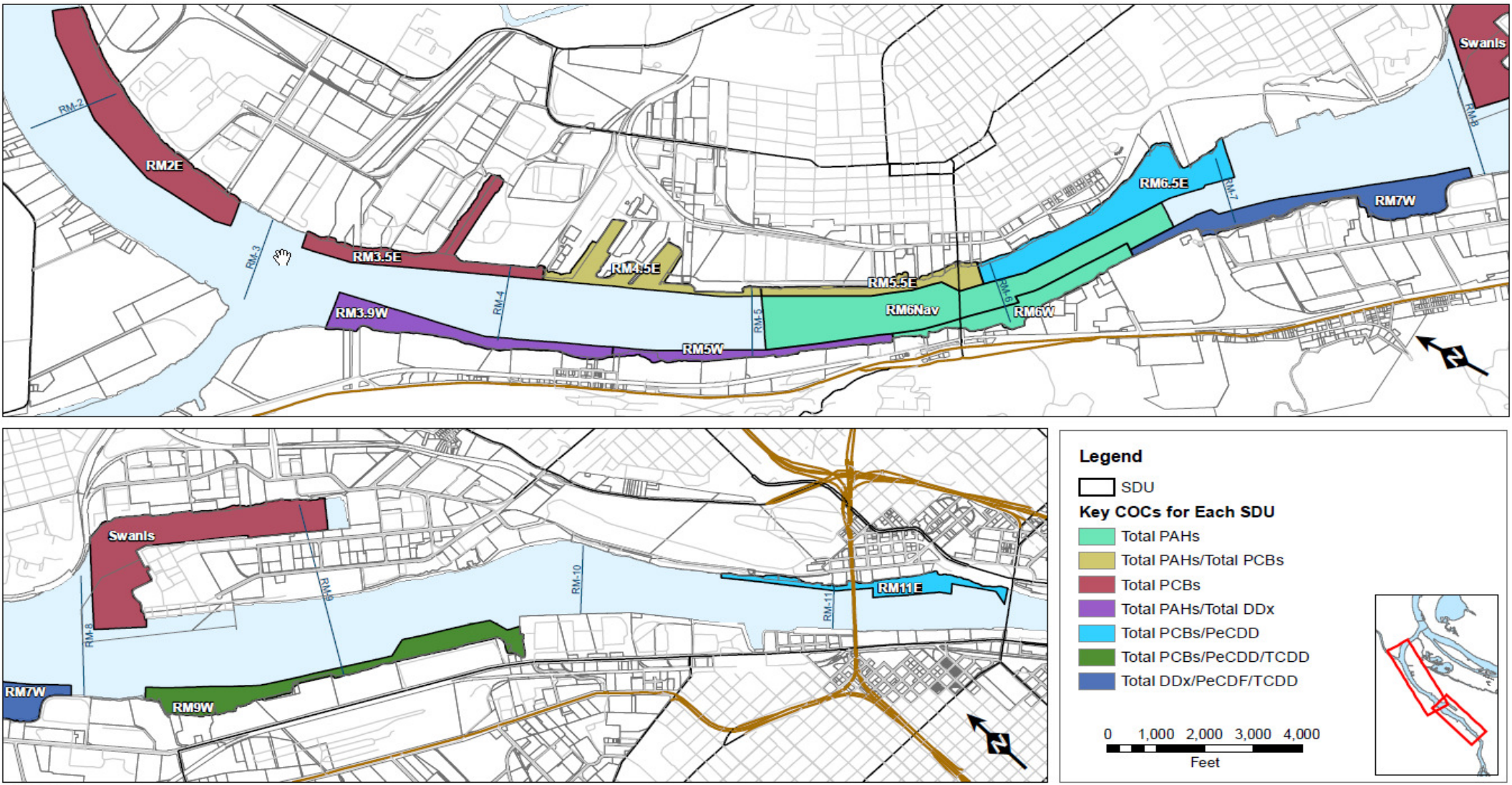
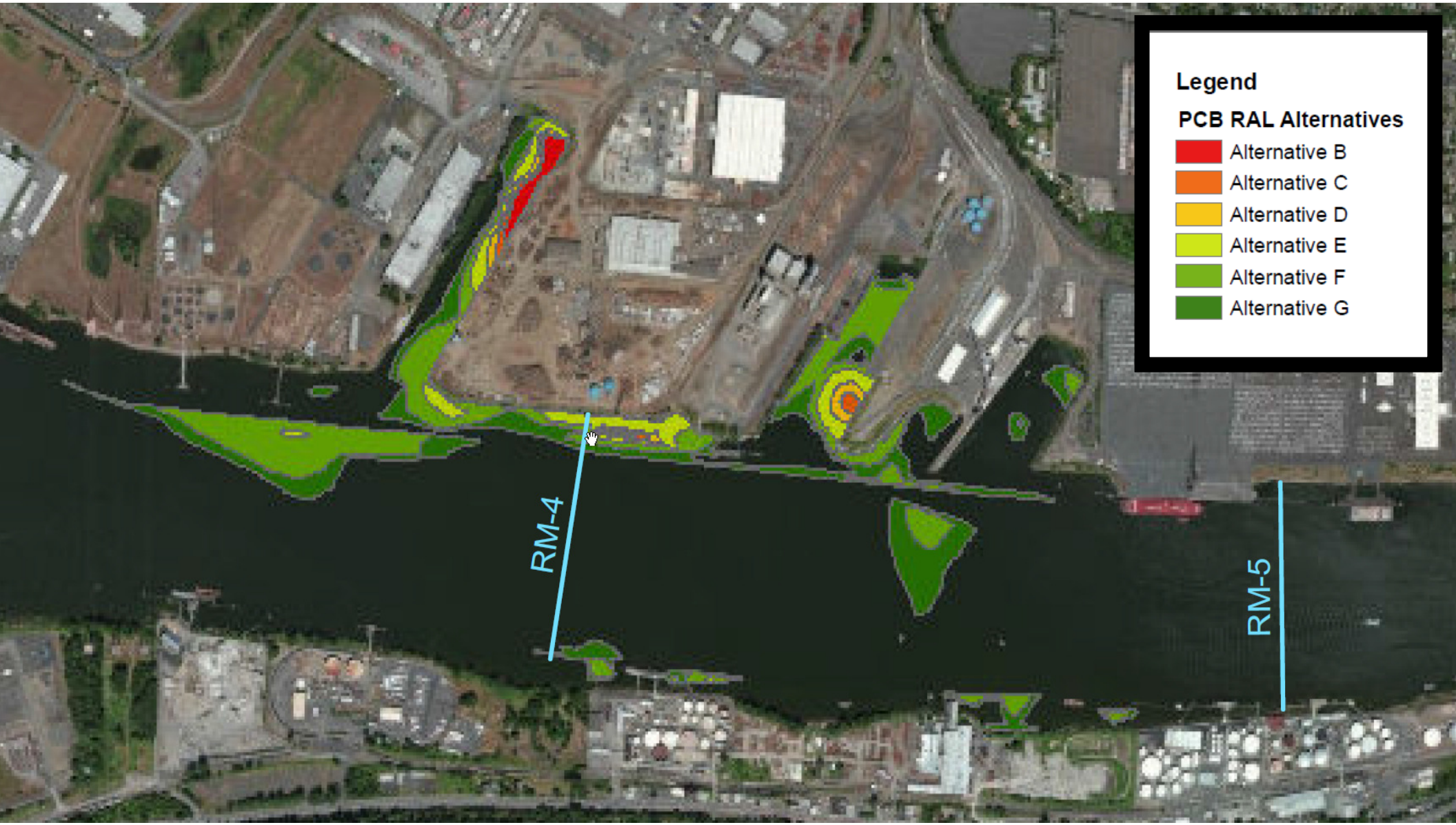


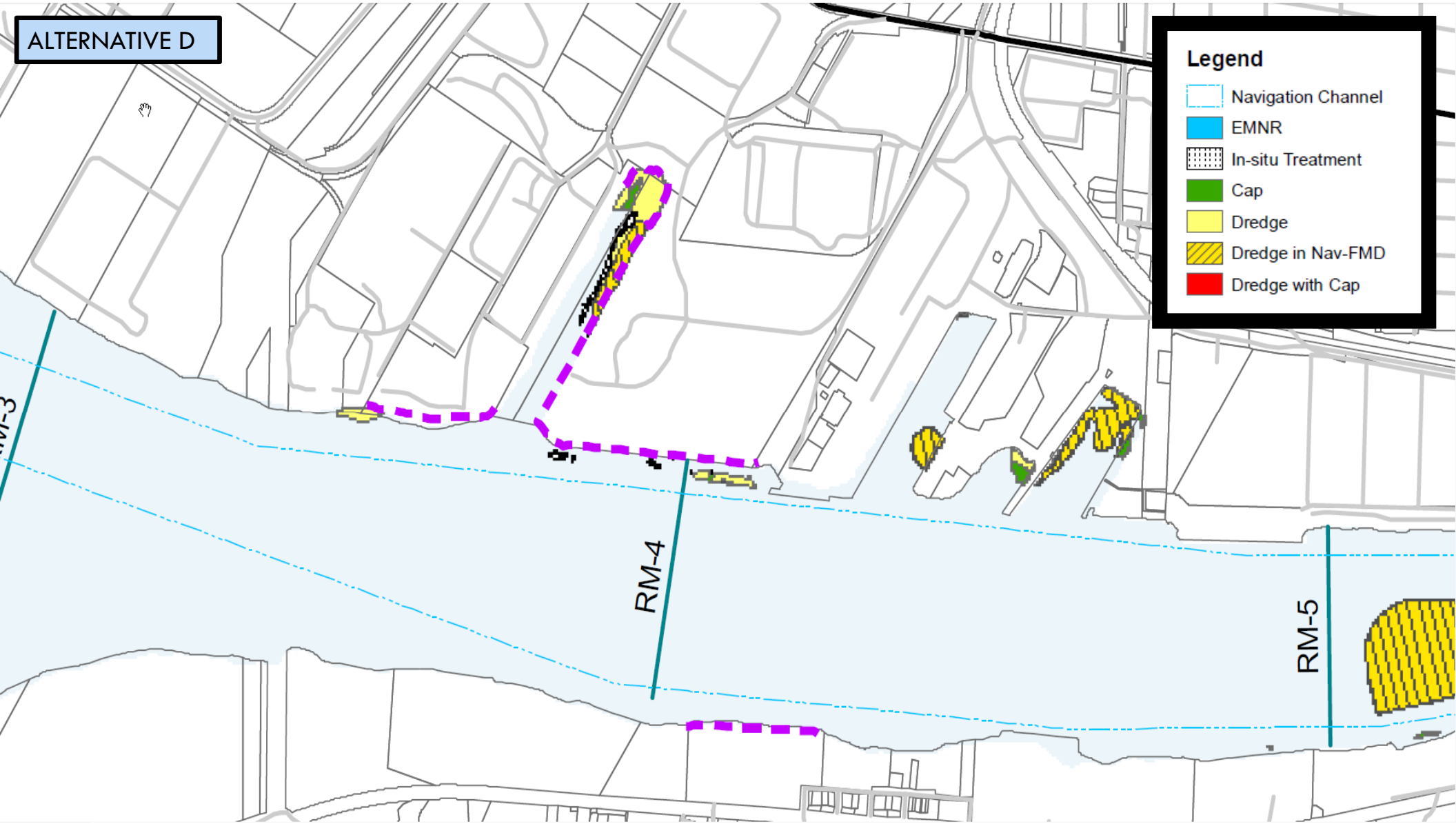
Source Credits:

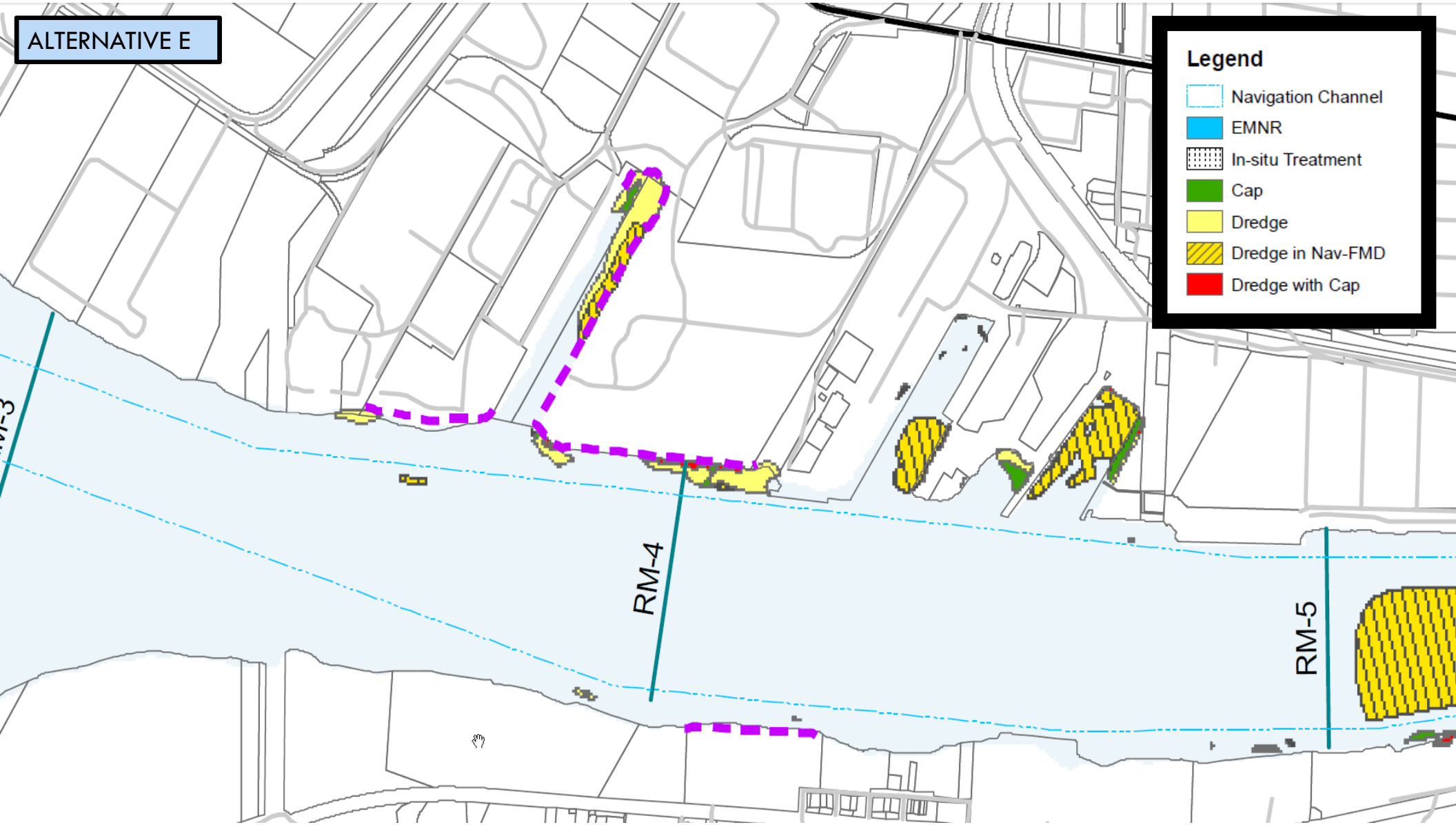
Figure 4.1-2. Sediment Decision Units and Key COCs


Legend
PCB RAL Alternatives
Alternative B
Alternative C
Alternative D
Alternative E
Alternative F
Alternative G
RM-4
RM-5

SMA TECHNOLOGIES CONSIDERED

- CAPS
- DREDGING & EXCAVATION
- DREDGE/CAP
- INSTITUTIONAL CONTROLS


ALTERNATIVE D
Legend
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap
RM-4
RM-5


ALTERNATIVE E
Legend
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap
RM-4
RM-5

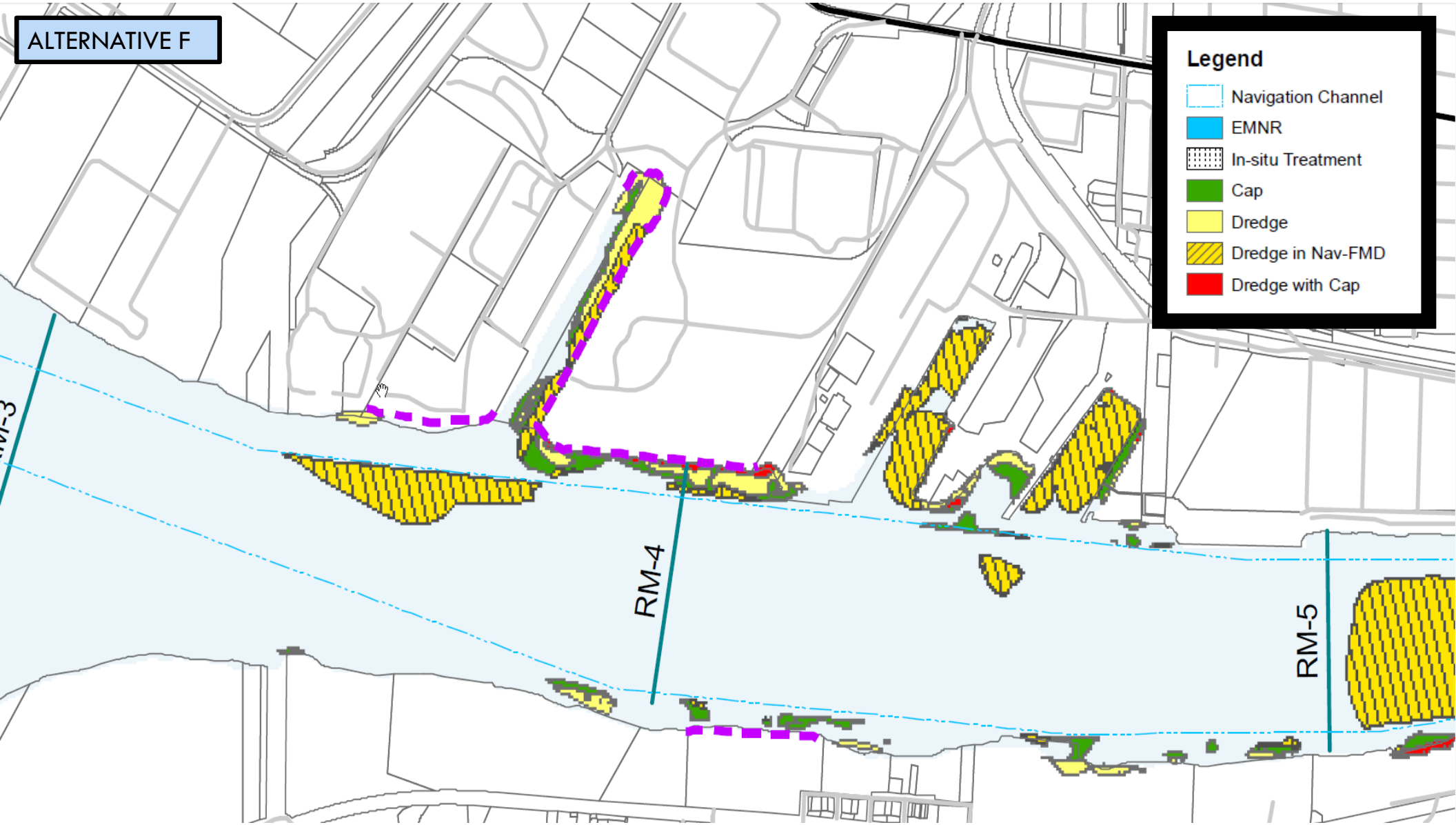
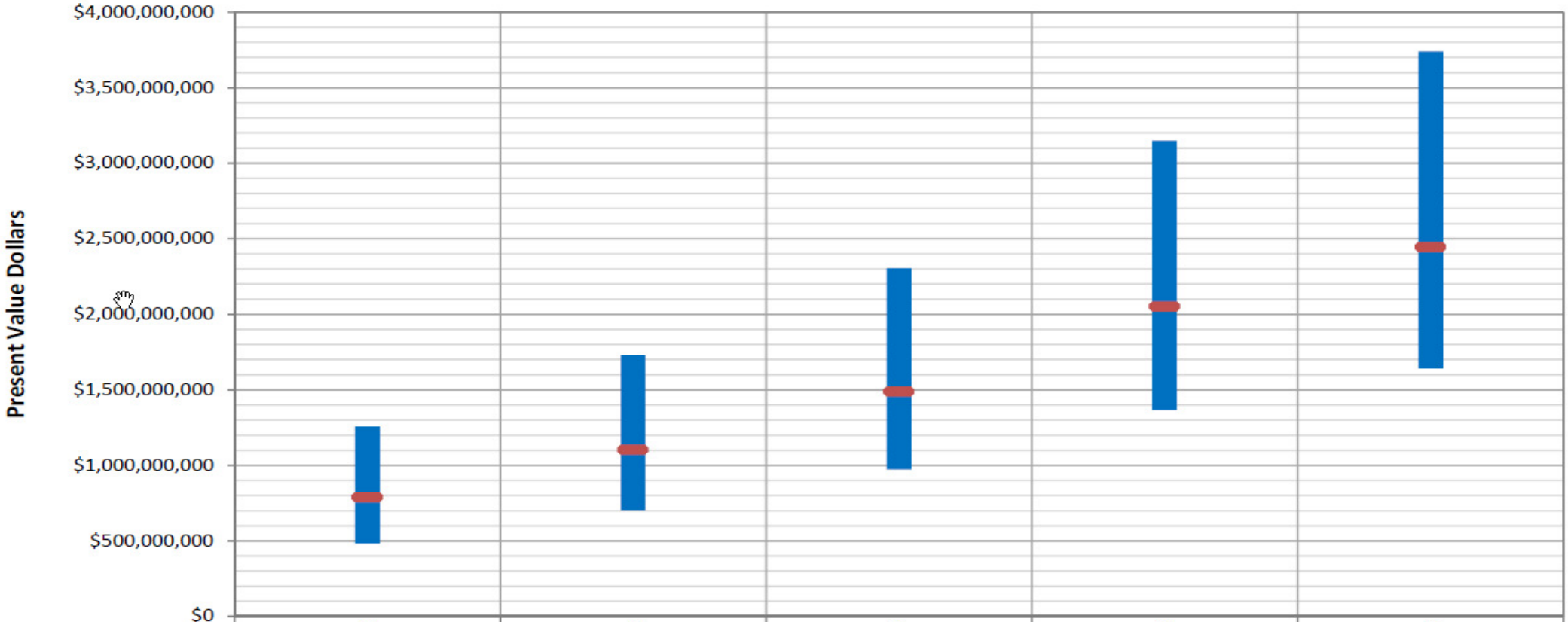

ALTERNATIVE F
Legend
Navigation Channel
EMNR
In-situ Treatment
Cap
Dredge
Dredge in Nav-FMD
Dredge with Cap
RM-4
RM-5

Exhibit CS-ALT
Alternative Cost Estimate Accuracy Ranges



	B	D	E	F	G
Present Value (-30%)	$553,609,000	$773,885,000	$1,043,427,000	$1,437,520,000	$1,712,515,000
Present Value	$790,870,000	$1,105,550,000	$1,490,610,000	$2,053,600,000	$2,446,450,000
Present Value (+50%)	$1,186,305,000	$1,658,325,000	$2,235,915,000	$3,080,400,000	$3,669,675,000

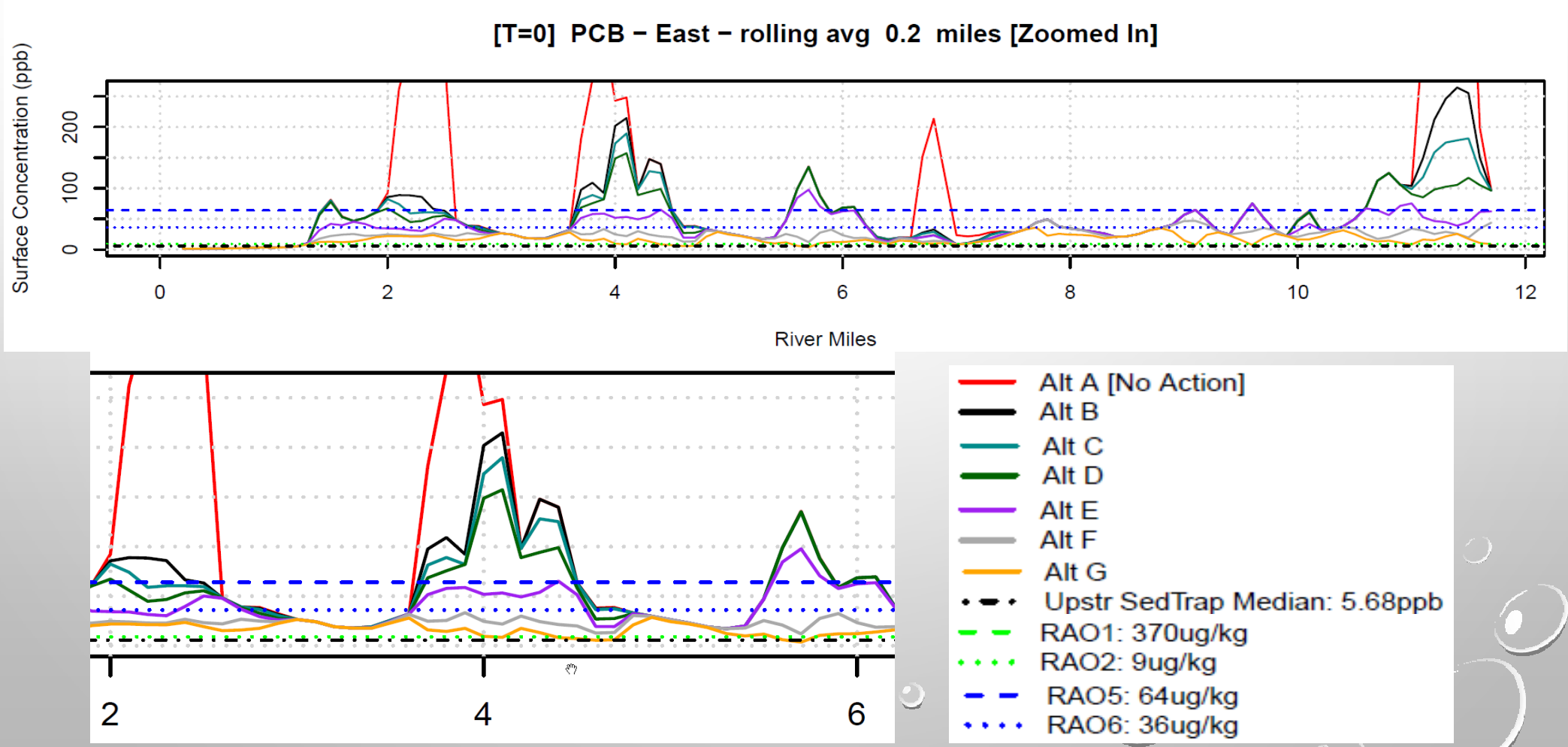
Alternative

COSTS WERE DEVELOPED FOR 26 SUB ELEMENTS

Alt E Sub Elements (examples)	Capital Cost
Mob/demob	$18 M
Institutional Controls	$1.6 M
Dredging (open water)*	$78 M
Dredging (confined)*	$19 M
Transload Facility Development	$14 M
Disposal RCRA C/TSCA	$368 M
Disposal RCRA D	$267 M
Mitigation	$100 M
Reactive/GAC Placement	$137 M
MNR	$11 M
5-Year Reviews, per review	$0.24 M

RELATIVE EFFECTIVENESS OF ALTERNATIVES*

*START TIME IS DIFFERENT FOR EACH ALTERNATIVE

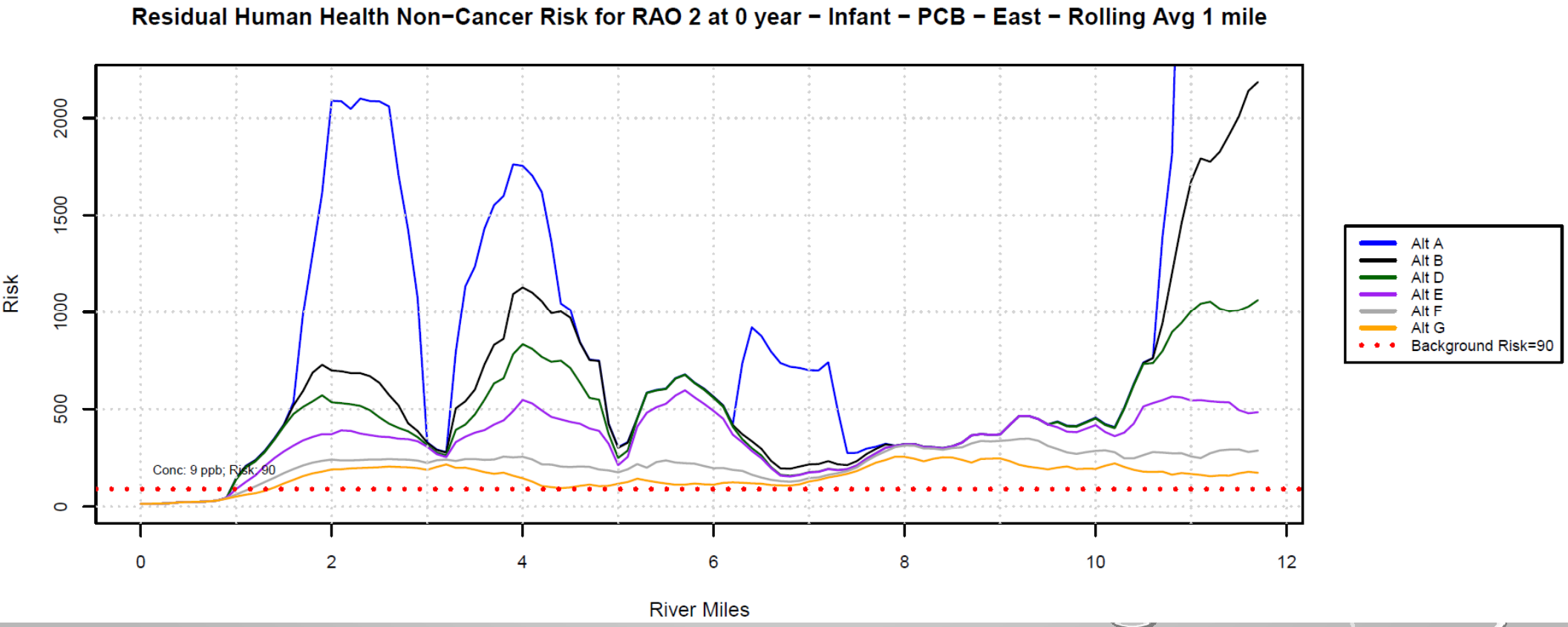


RISK REDUCTION AFTER CONSTRUCTION

- AT COMPLETION OF CONSTRUCTION, NONE OF THE ALTERNATIVES WILL TOTALLY ELIMINATE RISK

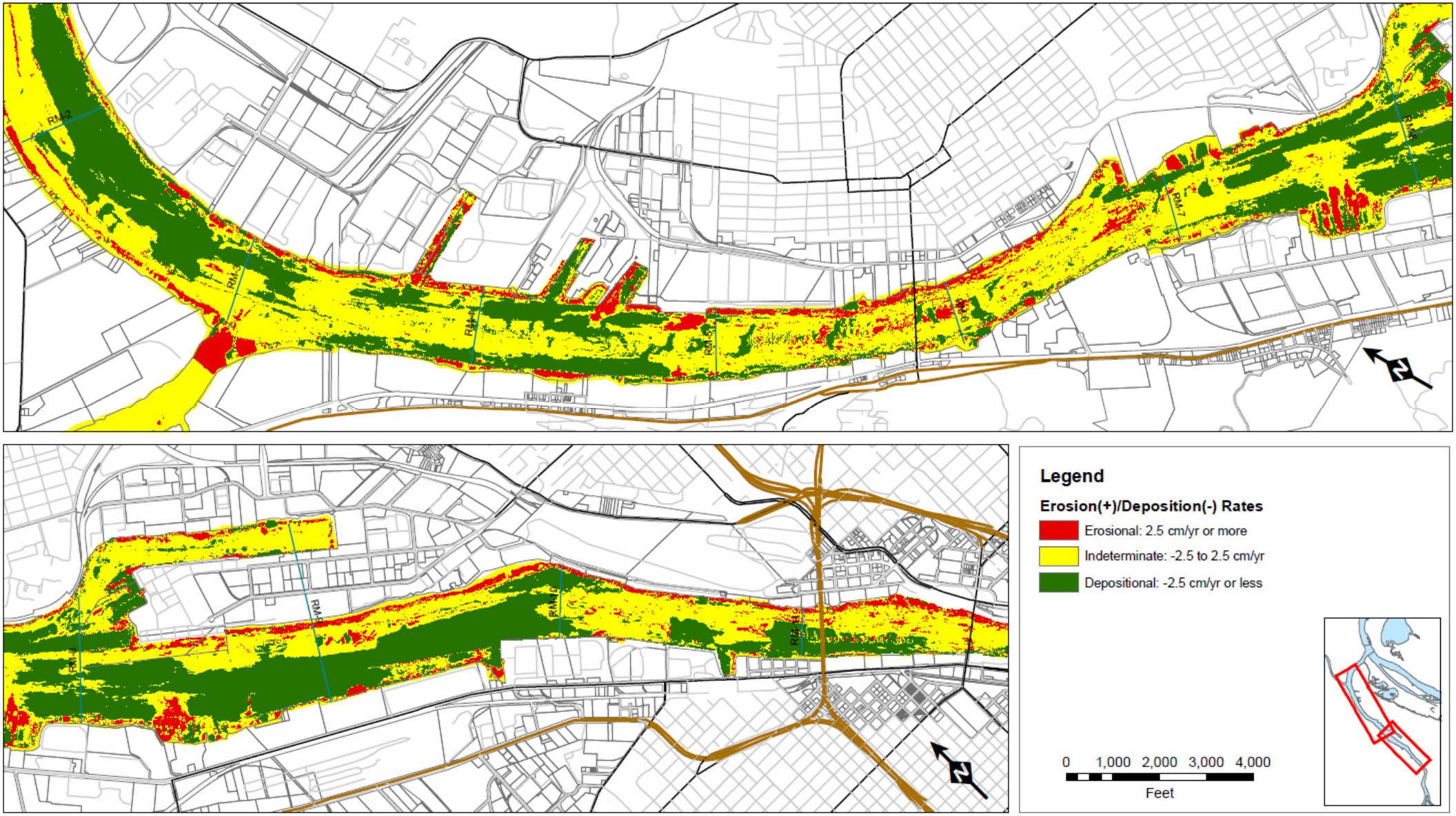
- EPA WILL EVALUATE THE ALTERNATIVES TAKING THE RESIDUAL RISK INTO CONSIDERATION

RESIDUAL RISKS OF ALTERNATIVES



MODELING THE RIVER

- RIVER IS HIGHLY DYNAMIC WITH EROSION/SEDIMENTATION OCCURRING THROUGHOUT SYSTEM, ANNUAL CYCLE AND DURING MAJOR FLOOD EVENTS
- WAVES (WIND AND BOAT WAKE) HAVE SIGNIFICANT EFFECT ON SHALLOW WATER AND BANK EROSION
- DREDGING AND PROP WASH RESULT FROM HIGHLY INDUSTRIALIZED RIVER



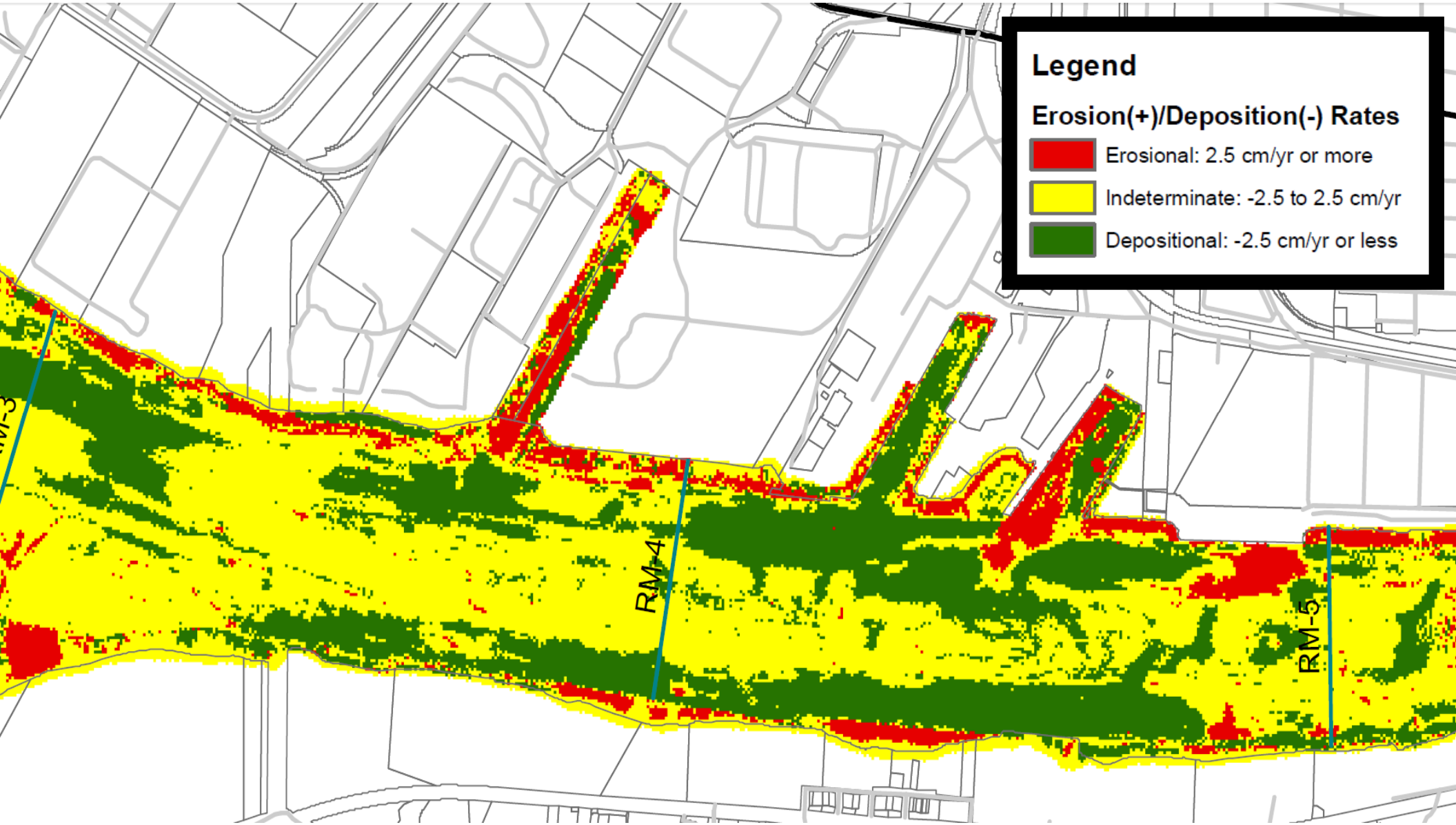
Legend

Erosion(+)/Deposition(-) Rates

- Erosional: 2.5 cm/yr or more
- Indeterminate: -2.5 to 2.5 cm/yr
- Depositional: -2.5 cm/yr or less

0 1,000 2,000 3,000 4,000

Feet


Legend
Erosion(+)/Deposition(-) Rates
Erosional: 2.5 cm/yr or more
Indeterminate: -2.5 to 2.5 cm/yr
Depositional: -2.5 cm/yr or less
RM-4
RM-5

NCP CRITERIA FOR ALTERNATIVE SELECTION ANALYSIS

- OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT (THRESHOLD)
- COMPLIANCE WITH ARARS (THRESHOLD)
- LONG-TERM EFFECTIVENESS AND PERMANENCE
- REDUCTION IN TOXICITY, MOBILITY &VOLUME BY TREATMENT
- SHORT-TERM EFFECTIVENESS
- IMPLEMENTABILITY
- COST

QUALITATIVE COMPARATIVE ANALYSIS

Remedial Alternative	Description	Threshold Criteria		Balancing Criteria				
		Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Present Value Cost (Dollars)
Contaminated Sediment Alternatives								
A	No Action/No Further Action	—	—	NA	NA	NA	NA	NA
B	Dredge 83 acres; Contain 4 acres Dredge/Cap 3 acres; EMNR 103 acres MNR 2,250 acres; In-situ 7 acres Ex-situ 321,120 cy; Disposal 892,000 cy	+	+	○	◔	◔	●	$790M
D	Dredge 161 acres; Contain 7 acres Dredge/Cap 6 acres; EMNR 88 acres MNR 2,185acres; In-situ 3 acres Ex-situ 395,060 cy; Disposal 1,766,000 cy	+	+	◔	◑	◔	◕	$1.1B
E	Dredge 249 acres; Contain 10 acres Dredge/Cap 10 acres; EMNR 60 acres MNR 2,121 acres; In-situ 0 acres Ex-situ 431,560 cy; Disposal 3,100,000 cy	+	+	◑	◕	●	◑	$1.5B
F	Dredge 479 acres; Contain 18 acres Dredge/Cap 17 acres; EMNR 24 acres MNR 1,913 acres; In-situ 0 acres Ex-situ 495,830 cy; Disposal 7,115,000 cy	+	+	◕	●	◕	◔	$2.1B
G	Dredge 741 acres; Contain 22 acres Dredge/Cap 18 acres; EMNR 15 acres MNR 1,655 acres; In-situ 0 acres Ex-situ 518,010 cy; Disposal 11,722,000 cy	+	+	●	●	◑	○	$2.5B

ALTERNATIVE SELECTION KEY OBJECTIVES

FINER DETAILS OF THE 5 BALANCING CRITERIA

- ADDRESSING MAJORITY OF PTW
- NO. OF PRGs ACHIEVED AT T=0
- MAXIMUM RISK REDUCTION IN SHORTEST CONSTRUCTION TIME
- OPTIMIZE RISK REDUCTION FOR EACH COC AT T=0
- MINIMIZE ECO RISKS AT T=0
- PERMANENCE
- MINIMIZE FUTURE LAND USE RESTRICTIONS (LESS CAPPING)
- MINIMIZE FUTURE ADDITIONAL REMEDIAL WORK
- MINIMIZE LONG TERM O&M
- IMPROVE LONG TERM PREDICTIONS WITH MNR

ALTERNATIVE SELECTION

- EPA CONTINUES TO INVESTIGATE AND EVALUATE THE DATA
- BASED ON THE DATA AND MODELING, EPA WANTS TO SELECT A REMEDY THAT:
  - PROVIDES GOOD BALANCE BETWEEN ADDRESSING ALL PTWs AND COST
  - PROVIDES MORE CERTAINTY IN EFFECTIVENESS AFTER CLEANUP
  - ACHIEVES RAO'S MORE QUICKLY
  - RELIES LESS ON INSTITUTIONAL CONTROLS
    - LESS LAND USE RESTRICTIONS
  - RELIES LESS ON MNR (NATURAL RECOVERY OF THE RIVER)

COMMUNICATION

- UPDATES ON ANY PUBLIC/MEDIA REACTION TO THE RELEASE OF SECTION 4
- CONGRESSIONAL DELEGATION'S INTEREST IN PUBLIC COMMUNICATION
- COMMUNICATION STRATEGY FOR CONCEPTUAL DESIGN
  - TALKING POINTS
  - AUDIENCE
  - COORDINATION WITH ODEQ